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संपीडक, वायुदाब चालित औज़ार और मशीनें — शब्दावली

भाग 2 संपीडक

Indian Standard

COMPRESSORS, PNEUMATIC TOOLS AND MACHINES — VOCABULARY

PART 2 COMPRESSORS

ICS 01.040.23; 01.040.25; 23.140; 25.140.10

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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Compressors, Blowers and Exhausters Sectional Committee, MED 22

NATIONAL FOREWORD

This Indian Standard (Part 2) which is identical with ISO 3857/II-1977 'Compressors, pneumatic tools and machines — Vocabulary — Part II : Compressors' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Compressors, Blowers and Exhausters Sectional Committee and approval of the Mechanical Engineering Division Council.

This standard supersedes IS 5727 : 1981 'Glossary of terms relating to compressors and exhausters' which was technically equivalent to ISO 3587-2 : 1972.

The text of the ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain terminology and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker in the International Standard while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

Indian Standard

COMPRESSORS, PNEUMATIC TOOLS AND MACHINES — VOCABULARY

PART 2 COMPRESSORS

SCOPE AND FIELD OF APPLICATION

This International Standard constitutes the second part of a vocabulary relating to compressors, pneumatic tools and machines. It deals with compressors. Part I deals with basic concepts, symbols and units. Part III[1] deals with pneumatic tools and machines.

1 GENERAL

1.1 swept volume for a displacement compressor : The volume swept in one revolution by the compressing element(s) of the compressor first stage.

1.2 displacement for a displacement compressor : The volume swept by the compressing element(s) of the compressor first stage per unit of time.

1.3 clearance volume : The volume inside a compression space, which contains gas trapped at the end of the compression cycle.

1.4 relative clearance volume : The ratio of clearance volume of the stage under consideration to the swept volume of the compressing element of this stage.

1.5 volume factor : A dimensionless number obtained by the division of the inlet volume rate of flow of one stage by the peripheral speed of the impeller and by the reference cross-section.

In the case of axial flow compressors, the chosen reference cross-section is the annular cross-section formed by the outside diameter and the hub diameter of the impeller under consideration.

1.6 standard inlet point : The inlet point considered representative for each compressor. This point varies with compressor design and type of installation. (Refer to the acceptance test standard concerning each particular compressor type.)

1.7 standard discharge point . The discharge point considered representative for each compressor. This point varies with compressor design and type of installation. (Refer to the acceptance test standard concerning each particular compressor type.)

1.8 standard inlet condition : The condition of the aspired gas at the standard inlet point of the compressor.

1.9 standard discharge condition : The condition of the compressed gas at the standard discharge point of the compressor.

1.10 tip Mach number : The ratio of the circumferential or peripheral velocity of a compressor impeller to the velocity of sound in the fluid at the temperature and inlet pressure under consideration.

2 TEMPERATURES

2.1 inlet temperature : The total temperature at the standard inlet point of the compressor.

2.2 discharge temperature : The total temperature at the standard discharge point of the compressor.

3 FLOW RATES

3.1 actual volume rate of flow of a compressor (actual capacity)[1] : The actual volume rate of flow of gas compressed and delivered at the standard discharge point, referred to conditions of total temperature, total pressure and composition (for example, humidity) prevailing at the standard inlet point.

3.2 standard volume rate of flow (standard capacity)[1] : The actual volume rate of flow of compressed gas as delivered at the standard discharge point, but referred to standard conditions (for temperature and pressure).

4 PRESSURES

4.1 inlet pressure : The total mean absolute pressure at the standard inlet point.

NOTE — The total absolute pressure may be replaced by the static absolute pressure provided that gas velocity and density are sufficiently low.

4.2 discharge pressure : The total mean absolute pressure at the standard discharge point.

NOTE — The total absolute pressure may be replaced by the static absolute pressure provided that gas velocity and density are sufficiently low.

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[1] In preparation.

[1] The expressions "actual capacity" and "standard capacity" must be avoided as they may be confusing.

4.3 total pressure ratio : The ratio between the discharge pressure and the inlet pressure.

4.4 stage pressure ratio : The pressure ratio for any particular stage in a multi-stage compressor, the discharge pressure being taken before the intercooler.

4.5 overall stage pressure ratio : The pressure ratio for any particular stage in a multi-stage compressor, the discharge pressure being taken after the intercooler (including separator).

4.6 pressure coefficient for one dynamic compressor stage . The dimensionless characteristic number obtained by division of the theoretical mass specific energy of one stage by the square of the peripheral velocity of the impeller of the stage under consideration.

4.7 overall pressure coefficient for a dynamic compressor : The dimensionless characteristic number obtained by division of the theoretical overall specific energy by the average of the squares of the peripheral velocities of the dynamic compressor impellers.

4.8 ideal multi-stage compression : The compression when a perfect gas is isentropically compressed and the gas inlet temperature as well as the amount of work spent is the same for each stage.

5 POWERS

According to the chosen reference process, the thermodynamic cycle may be :

- isothermal, i.e. assuming a compression at a constant temperature in a compressor without losses;
- isentropic (reversible adiabatic), i.e. assuming a compression with constant entropy;
- polytropic, i.e. assuming a reversible compression following a curve as close as possible to the true curve.

5.1 theoretical required power : In a compressor without losses, power which is theoretically required to compress a gas according to the chosen reference process, from a given inlet pressure to a given discharge pressure.

5.2 indicated power : Power corresponding to the pressure-volume diagram recorded by means of an indicator.

5.3 internal power . The indicated power to which are added the losses due to heat transmission and leaks.

5.4 shaft power : Power required on the compressor driving shaft. It is obtained by adding the mechanical losses to the internal power. The losses in external transmissions such as gear drives or belt drives are not included.

6 SPECIFIC ENERGY REQUIREMENT

6.1 theoretical specific energy requirement : The work necessary to compress a unit mass of gas (mass specific energy) or unit volume of gas[1] (volume specific energy) according to the chosen reference process (isothermal, isentropic, polytropic)[2].

6.2 actual specific energy requirement : The shaft input energy per unit of compressor actual rate of flow.

7 EFFICIENCIES

7.1 theoretical efficiency : The ratio of the theoretical required power to the indicated power. According to the chosen reversible reference process, the theoretical efficiency may be polytropic, isentropic or isothermal.

7.2 internal efficiency : The ratio of the theoretical required power to the internal power.

7.3 mechanical efficiency : The ratio of the internal power to the shaft power.

7.4 overall efficiency : The ratio of the theoretical required power to the shaft power.

7.5 volumetric efficiency : The ratio of the actual volume rate of flow to the displacement of a displacement compressor. Condensates may possibly be taken into account.

8 RELATED INFORMATION

8.1 heat balance of a dynamic compressor : The power required by a dynamic compressor can be calculated from the heat balance if it is impossible to ascertain the electrical or mechanical power. For obtaining the heat balance, the flow and temperature rises of the compressed gas and of the coolant are measured, including those of the oil used for cooling and lubricating bearings.

8.2 specified performance : The performance fixed contractually.

NOTE — Not to be confused with "nominal characteristics", wording commonly used by manufacturers, for guidance, for the definition of their machines.

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[1] See 3.2.

[2] See clause 5.

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